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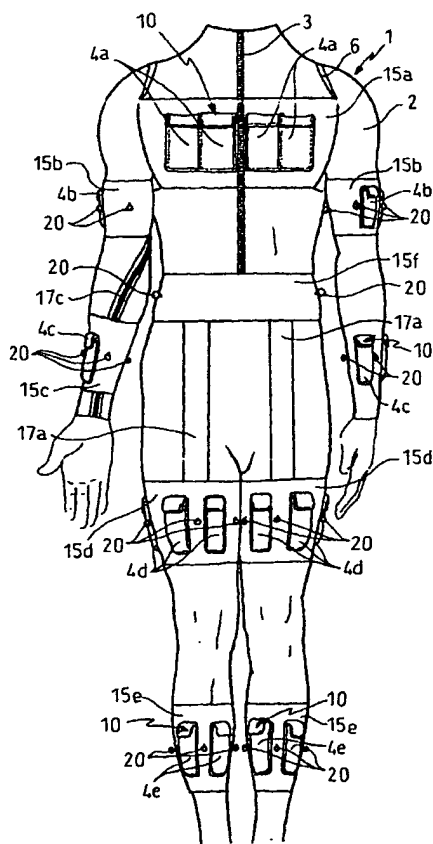
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- (71) Applicant and  
(72) Inventor: CAVALLERA, Pier, Giorgio [IT/TT]; Via Pontida, 4, I-20121 Milano (IT).
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(54) Title: SPORTS GARMENT FOR TRAINING



(57) Abstract: A sports garment (1) for training comprises a supporting fabric (2) which encloses, at least partially, the user's body. The said garment is in the form of a track suit provided at the front with a fastener (3), and reinforced bands (15a-15f) are applied over the supporting fabric (2), to which bands are applied pockets (4a-4e) for accommodating weights (5). Elastic elements (18) may be applied to the supporting fabric (2) by means of hooks (19) and rings (20).

WO 02/26330 A1



*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## DESCRIPTION

## Sports garment for training

5       The present invention relates to a sports garment for training.

      The present invention refers primarily to the sector of physical and athletic preparation, to increase the resistance in the athletes' movements by making use  
10 of weights and/or other means in order to improve the efficiency and efficacy of the said training. Secondly, the present invention is comprised within the sector of instruments for specific training intended to strengthen and/or tone the muscles in the entire sector commonly  
15 referred to by the word "fitness" and indicating activities intended to achieve and maintain good physical condition.

      As is known, particularly in the sporting disciplines commonly grouped under the generic name of  
20 athletics, and in particular in running, there is a great awareness of the need to undertake training under load conditions that are more onerous than the normal conditions to which the athlete is subject during competition.

25       This requirement is generally met by weighting the

body of the athlete during training so as to induce him to make a greater effort, which strengthens his muscles.

For the purpose of weighting an athlete's body, loaded belts and straps are known which may be applied to the waist or to the ends of the limbs. Such belts can be positioned and adjusted depending on size and on the point of application. For example, ankle or wrist straps are known which are filled with sand or other material and fitted with a velcro band which is tightened around the athlete's ankle or wrist.

Belts and straps of the abovementioned type, while solving the problem of weighting the athlete's body, exhibit some disadvantages.

First, the weight of each strap or belt is substantially predetermined, so that, in order to vary the intensity of the effort during training, it becomes necessary to have a fairly wide range of belts available, corresponding to different weights.

Secondly, positioning and fixing are not easy, in that each strap has to be sufficiently tight, in order to prevent the athlete's movements being limited, but not excessively so. This difficulty is more apparent in the case of straps to be placed on the wrists, in the application of which the user is compelled to work with only one hand.

In addition to the above, a further factor is that the abovementioned straps and/or belts can be positioned only at particular points, such as for example the waist, the wrists and the ankles, other positions being  
5 difficult to find.

Apart from the need to increase the efficacy of training activities in general, there is also much awareness of the need to strengthen and/or tone certain muscle fasciae by performing selective exercises.

10 In the athletic preparation sector, as also in the "fitness" sector, activities and exercises designed to strengthen the muscles serve the purpose of improving explosive, resistant and maximal power without excessively increasing the actual weight.

15 Currently, the need to strengthen the muscles and improve the three types of power referred to above is met by the use of the straps or belts described above, or by the use of weights, dumb-bells and bars to be gripped with the hands or, finally, by the use of  
20 machines, some of these being appropriately designed to allow movements such as to exercise, and hence selectively develop, the muscular fasciae in question.

With reference to this latter case, machines are in fact known which make it possible to exercise, for  
25 example, the pectoral muscles or the adductors,

compelling the user to perform a movement which the machine opposes with a resistance whose strength varies as a function of the desired level of training.

Finally, in order to tone a muscle fascia, it is known for example to use springs which are gripped in order to perform exercises with the upper limbs or locked in the vicinity of the lower limbs and deformed as a result of specific exercises.

While the above solutions provide useful assistance in the performance of muscle strengthening and/or toning exercises, it is nevertheless clear that they do exhibit certain disadvantages. In particular, straps, weights and springs are all particularly uncomfortable to use. Furthermore, specialized knowledge is required in order for these devices to be applied in the right position, enabling a particular muscle fascia to be exercised without performing incorrect movements and, possibly, damaging the muscles and/or skeletal structure.

Apart from what has been discussed above, another factor is that, in the case of straps and weights, it is necessary to provide a somewhat extensive range of grades allowing various levels of training to be undertaken, depending on specific requirements.

Finally, the known machines designed to exercise specific muscle fasciae are fairly costly and bulky, are

non-transportable and can generally be regarded as apparatus provided by equipped gymnasiums and thus available to individual users only in one place and during particular periods.

5       The problem underlying the present invention is that of providing a sports garment for training which possesses structural and functional features such as to meet the above requirements and, at the same time, make it possible to overcome the disadvantages mentioned in  
10 connection with the prior art.

      This object is achieved by means of a sports garment for training, comprising a supporting fabric which encloses, at least partially, the user's body, resistance elements opposing the movement of the muscles  
15 and applicable to the supporting fabric at points variously positioned over the said fabric to generate a resistance depending on the type of effort to be exerted, and means for securing the resistance elements on the supporting fabric, the said means being  
20 operatively connected to the said supporting fabric.

      Further features and the advantages of the sports garment according to the present invention will become apparent from the description given below of a few preferred examples of embodiment, given by way of  
25 indication and without implying any limitation, with

reference to the attached Figures, in which:

Figure 1 shows a frontal elevation of a sports garment for training according to the present invention, produced in a male version in which an embodiment with reinforced bands and an embodiment without reinforced bands are shown simultaneously;

Figure 2 shows a lateral view of the sports garment of Figure 1;

Figure 3 shows the sports garment of Figure 2 in which, to simplify the illustration, certain details have been omitted and a different user position has been illustrated to show the course followed by a non-deformable band;

Figure 4 shows the sports garment of Figure 1, produced in a female version;

Figure 5 shows an enlarged detail of the garment of Figure 1, corresponding to various pockets for accommodating weights;

Figure 6 shows a possible alternative embodiment of one of the pockets in which a weight has been partly inserted;

Figure 7 shows a possible alternative embodiment of the pockets of Figure 5;

Figure 8 shows a possible training exercise that can be performed with the garment according to the



present invention;

Figure 9 shows an enlarged detail of Figure 8, corresponding to the means for fixing elastic elements on the supporting fabric which defines the said garment;

5        Figures 10 and 11 show, respectively, other possible training exercises that can be performed with the garment according to the present invention;

Figure 12 shows an elevation of a sports training garment in a possible alternative embodiment that can be  
10        used to perform movement and/or training activities in water, in which an embodiment with reinforced bands and an embodiment without reinforced bands are shown simultaneously;

Figure 13 shows an enlarged detail of the sports  
15        garment of Figure 12, corresponding to a fin removably fixed to the supporting fabric which forms the said sports garment;

Figure 14 shows a lateral view of the sports garment for training of Figure 12;

20        Figure 15 shows a frontal elevation of a possible alternative embodiment of the sports garment for training of Figure 1, corresponding to a two-piece version in which the left-hand half of the upper portion has been omitted to show the braces of the lower  
25        portion;

Figure 16 shows a frontal elevation of a possible alternative embodiment of the sports garment for training of Figure 1;

Figure 17 shows a lateral view of the sports garment of Figure 16; and

Figure 18 shows a rear elevation of the sports garment of Figure 16.

With reference to the abovementioned Figures, 1 designates, as a whole, a sports garment for training that can be used to perform a specific muscular activity as a function of the user's requirements.

The sports garment shown with reference to Figures 1 to 11 can be used for any type of training. For example, it may be used to weight the athlete's body during general running or athletics training activities or specific training activities for team games or other individual sports, or for carrying out a specific training activity, including a stationery activity, performing predetermined exercises intended to reinforce, strengthen or tone certain muscular fasciae, thus replacing equipment or machinery in common use hitherto.

The sports garment 1 comprises a supporting fabric 2 which encloses the body of the user and is advantageously shaped as a track suit enclosing both the

trunk and the upper and lower limbs. The supporting fabric is preferably of the elastic type, in order to cling to the body and not obstruct the athlete's movements.

5       The embodiment shown in Figure 1, corresponding to a male version of the abovementioned track suit, provides for the latter to be produced in a single piece and to extend over the major part of the user's body, from the neck to the ends of both the upper and lower  
10 limbs.

In order to assist the user in putting on the track suit and removing it, the supporting fabric may advantageously comprise a fastener 3 which extends over at least part of the length of the user's trunk. In the  
15 example shown in Figure 1, for simplicity of use, the fastener 3 is positioned at the front, in the central position, and extends substantially from the neck to the waist of the garment 1.

As illustrated in Figure 1 and in Figure 2, the  
20 sports garment 1 comprises pockets 4a, 4b, 4c, 4d and 4e applied to the supporting fabric 2 and intended to accommodate weights 5.

In particular in Figure 1, in the position corresponding to the user's left forearm, a solution is  
25 shown in which the pockets are applied directly to the

supporting fabric 2.

The weights 5 form elements that resist the movement of the muscles and may be applied to the supporting fabric 2 in variable quantities and at variously positioned points over the said fabric, so as to create a resistance that varies in amount and/or positioning as a function of the type of effort to be exerted and of the muscle fascia to be stressed.

The weights 5, may, for example, be produced from lead and their shape may advantageously comprise an arcuate outer surface 6, to avoid sharp edges or notable projections. The shape of one of the weights is shown in Figure 6 by way of indication, the weight here being partially inserted inside one of the pockets.

The dimensions and therefore amount of the weights may be variable. For example, use may be made of weights having a maximum thickness equal to about 1 cm and a maximum width of between 2 and 2.5 cm. The level of the weights may vary, bearing in mind that, in order to obtain good modular arrangements and good distribution of the overall weight, it is advantageous to use weights which individually do not exceed 600 grams.

The pockets 4a, 4b, 4c, 4d and 4e therefore represent means for securing the resistance elements, or the weights 5, on the supporting fabric 2, so as to

produce a sports garment 1 adaptable to different requirements.

In Figures 1 and 2, and in the enlarged details shown in Figures 5, 6 and 7, the pockets and their  
5 distribution over the garment 1 are shown. Advantageously, the pockets define a volume of shape and dimensions substantially equal to those of the corresponding weights.

Figure 1 shows an example of the distribution of  
10 the pockets 4a, 4b, 4c, 4d and 4e, respectively positioned in five regions corresponding, respectively, to the chest region, the regions of the arms and of the forearms, and finally the regions of the thighs and of the calves.

15 In the chest region, four pockets are provided, bearing the reference 4a, possibly subdivided into pairs by the fastener 3. As shown in Figure 2, it is advantageous that the corresponding region of the back at the same height possesses no pockets so as not to  
20 constitute an obstruction to any exercises in which the user adopts the supine position and so as not to overload the spinal column.

Both the region of the arm, corresponding to the region between the shoulder and the elbow, and that of  
25 the forearm, corresponding to the region between the

elbow and the wrist, comprise three individual pockets, respectively bearing the references 4b and 4c. These pockets are positioned in the front, at the side and in the rear, leaving free the region on the inside facing  
5 the user's trunk.

Similarly, the region of the thighs, positioned at about the halfway point of the quadriceps, and that of the calf, positioned at about the halfway point of the calf, each comprise three individual pockets,  
10 respectively bearing the references 4d and 4e. These pockets are uniformly distributed over the front and outer lateral regions of the lower limbs, leaving free the inner region between the two legs and the rear region to avoid inconveniencing the user during the  
15 performance of exercises in the supine position or when running.

With regard to the shaping of the pockets, Figure 5 illustrates a possible solution that is particularly indicated for the pocket 4a of the chest region, though  
20 it can also be used in the other regions. In the abovementioned solution, the pockets 4a are produced with a layer 7 of fabric having a substantially rectangular shape and stitched at regular intervals with mutually parallel stitches 8. Two adjacent stitches 8  
25 laterally define a pocket 4a, while a further, lower

stitch, not shown, closes the base of the respective pocket.

Alternatively, at least one of the stitches 8 may be replaced by strips of velcro 9, as shown in Figure 7, or with other similar means (not shown).

Figure 6 illustrates one of the pockets preferably used as an individual pocket 4b in the region of the arm. This shape is also similar in the case of the pockets 4c, 4d and 4e, respectively positioned in the region of the forearm, of the thigh and of the calf. In this case, an individual layer of fabric 7 is stitched on three sides for each of the individual pockets.

In Figures 1, 2, 5 and 6, the pockets also comprise closure means 10, which serve to close the upper, access side of each pocket and prevent the escape of the weight. Such closure means may, for example, comprise a flap 11 having a first end solidly fixed to the supporting fabric 2 and a second end that can be removably fixed to the fabric of the pocket.

In Figures 5 and 6, the flap 11 adheres to the layer 7 by means of velcro strips 12, respectively stitched to the inside of the flap and to the outside of the pocket.

As shown in Figure 5, the pockets, and in particular the pockets 4a of the chest region, may also

14

comprise lateral adhesion means 13, whose purpose is to cause a portion of the outer lateral surface of two adjacent pockets to adhere, for example by means of velcro strips 14. The presence of the lateral adhesion means 13 makes the pockets more compact and prevents undesirable movements of the weights within them, increasing the convenience of use of the whole garment 1.

As shown in Figures 1, 2 and 3, the supporting fabric 2 may also comprise reinforced bands bearing the references 15a, 15b, 15c, 15d, 15e and 15f and made in the same position as the means for securing the resistance elements, which, in the present case, means the position of the regions in which the pockets are applied.

More specifically, Figure 1 shows simultaneously both the solution with reinforced bands and that without reinforced bands. Specifically, the version shown in Figure 1 demonstrates the fact that, for example, the pockets of the user's left forearm are applied directly to the supporting fabric 2, while the other pockets are applied to the respective reinforced bands.

The reinforced bands may be produced with one or more layers of fabric applied to the supporting fabric 2, or may be obtained directly in the supporting fabric



2 at the stage of production of the latter. The reinforced bands enclose the supporting fabric 2 at the front, side and rear, and in the majority of cases the pockets are applied to the said bands.

5 As shown in Figure 1, the supporting layer 2 comprises a reinforced band 15a positioned in the vicinity of the chest region. The corresponding pockets 4a are fixed to this band. Moreover, this band extends in part over the shoulders as well, by means of  
10 extensions 16 which help to support the weights, avoiding the supporting fabric 2 being pulled out of shape.

Additional reinforced bands are provided in the regions of the arms, the forearms, the thighs and the  
15 calves, and have been designated respectively with the references 15b, 15c, 15d and 15e. The corresponding pockets 4b, 4c, 4d and 4e are applied to each of the abovementioned bands.

A further reinforced band 15f may be provided at  
20 the user's waist. To this latter band are applied further means for securing resistance elements, as will be described in due course.

Apart from the reinforced bands 15a, 15b, 15c, 15d, 15e and 15f, which extend substantially in the  
25 horizontal direction, the supporting fabric 2 also

comprises non-deformable bands 17a, 17b and 17c which vertically connect the portions of supporting fabric to which the means for securing the resistance elements are solidly fixed. In particular, the non-deformable bands 17a, 17b and 17c interconnect at least two reinforced bands and may, for example, comprise one or more further layers of fabric applied to the supporting fabric 2.

Figure 1 illustrates two first non-deformable bands 17a which connect the reinforced band 15f, which is seen in the position of the user's waist, to the bands indicated by 15d and corresponding to the regions of the thighs. The two abovementioned non-deformable bands 17a extend vertically in the central region of the respective thigh. Two analogous rear non-deformable bands (not shown) may also be provided.

Figure 1, and in more detail Figures 2 and 3, show further non-deformable bands 17b and 17c positioned on the lateral portions of the garment 1. In particular, Figure 2 shows a non-deformable band 17b which extends from the neck to the wrist along the outer part of the arm and forearm. This band simultaneously supports the weight of the arm region and that of the forearm, corresponding to the reinforced bands 15b and 15c. A similar non-deformable band (not shown) is provided on the other side of the garment.

Figure 3, and Figure 1 partially, show a further non-deformable band 17c which extends from the wrist to the ankle, passing through the attachment of the sleeves to the trunk and positioned on the inner part of the arm and forearm and along the flank of the user. This band helps to support both the weight of the region of the arm and forearm, corresponding to the reinforced bands 15b and 15c, and that of the region of the thighs and calves, corresponding to the reinforced bands 15d and 15e. A similar non-deformable band (not shown) is provided on the other flank of the garment.

Apart from the weights 5, the garment of Figure 1 may provide further resistance elements, more clearly shown in Figures 8 to 11. These elements may, specifically, comprise elastic elements 18, which may take the form of elastic as such or of springs.

The abovementioned elastic elements 18 have both ends capable of being fixed to the supporting fabric 2 by means of hooks 19 solidly fixed to the ends of the elastic element and rings 20 distributed over the supporting fabric 2.

The hooks 19 and the rings 20 constitute further means for securing the resistance elements to the supporting fabric, just as the elastic elements 18 constitute further elements providing resistance to the

movement of the muscles and capable of being applied to the supporting fabric at variously positioned points over the said fabric.

Advantageously, the hooks 19 comprise at least one  
5 portion 19a which can be moved between a closure position and an open position, so as to prevent the hook from escaping from the associated ring during the movements performed by the athlete.

As is shown in Figure 1, the rings 20 to which the  
10 hooks 19 are connected are positioned at the locations of the reinforced bands 15b, 15c, 15d, 15e and 15f, for example between one pocket and the next.

In the example shown in Figure 1, with the exception of the chest band, the other reinforced bands  
15 15b, 15c, 15d, 15e comprise four rings each, uniformly distributed at the same level. Both in the case of the reinforced bands corresponding to the region of the thigh 15d and to that of the calf 15e and in the case of the reinforced bands corresponding to the region of the  
20 arm 15b and to that of the forearm 15c, the rings 20 are positioned, respectively, in the front, rear, outer lateral and inner lateral positions.

In Figure 1, the reinforced band 15f which is positioned at the user's waist also possesses two rings  
.25 20, respectively positioned on the flanks of the said

user.

Figure 4 shows a front elevation of an alternative embodiment of the sports garment of Figure 1, corresponding to a female version of the garment of Figure 1.

In Figure 4, the elements in common with Figure 1 have been only partially shown and correspondingly indicated with the same numbers. A detailed description will be given below of the elements distinguishing the solution shown in Figure 1 and that shown in Figure 4.

In particular, 4b, 4c, 4d and 4e have been used to designate the pockets which are the subject of a corresponding version in Figure 1, while 40 has been used to designate a pocket positioned in the chest region in the central position and slightly higher than the corresponding pockets of the male version. The abovementioned pocket additionally possesses a triangular shape, with the apex pointing downwards for better adaptation to the anatomy of the user. The pocket 40 also possesses closure means embodied by the flap 11 which closes over the said pocket by virtue of strips of velcro (not shown).

The pocket 40 may accommodate a weight (not shown) of similar shape.

Moreover, 30 has been used to designate a fastener

which enables the garment 1 to be easily put on. This fastener extends from a lateral portion of the neck, diverts adjacent to one side of the pocket 40 and continues centrally as far as the waist.

5        A description will now be given of the method of use of the sports garment for training described above.

      The abovementioned garment may be used during training activities for disciplines such as, for example, running or athletics in general. With the  
10       appropriate selection of the number, size and positioning of the weights 5, it is possible to vary the effort expended by the athlete and consequently achieve the desired level of training.

      The possibilities provided by the garment forming  
15       the subject of the present invention are numerous and can be varied from the condition of minimum effort, corresponding to the garment devoid of any weight 5, to the condition of maximum effort, in which all the pockets accommodate a weight 5 of maximum size.

20       In order to undertake a training activity designed to develop a particular muscle fascia, moreover, it is possible to undertake exercises after loading the corresponding pockets with weights. This makes it possible to operate with the hands free, and without the  
25       use of machinery.

In order to tone particular muscle fasciae, it is also possible to hook one or more elastic members 18 on the rings 20.

Since the position of the rings remains unchanged  
5 relative to the body of the user, the movements are correct and the corresponding stresses are in no danger of causing harm to the muscles and/or the skeletal structure.

Figures 8, 10 and 11 illustrate a number of  
10 possible movements, although it is clear that the distribution of the rings 20 over the supporting fabric 2 allows a substantial versatility in use which extends beyond the examples described.

Figure 8 shows, for example, an elastic element 18  
15 whose ends are applied, respectively, to the band at the waist and to the band corresponding to the forearm region. The movement illustrated by a dotted arrow permits, for example, toning of the muscles of the lateral deltoid.

Similarly, Figure 10 shows, for example, an elastic  
20 element 18 whose ends are applied, respectively, to the band at the waist and to the band corresponding to the calf region. The movement illustrated by a dotted arrow permits, for example, toning of the muscles of the  
25 quadriceps.

Finally, Figure 11 shows, for example, an elastic element 18 whose ends are applied, respectively, to the bands corresponding to the regions of the calves. The movement illustrated by a dotted arrow permits, for example, toning of the tensor of the lateral fascia and the adductors.

Figures 12 and 13 show a second example of embodiment of a sports garment 100, which can be used to carry out movement and/or training activities in water.

For simplicity of description, the elements described in the example of Figure 1 which are also to be found in substantially identical form in this latter solution are designated by the same reference numbers and will be described only briefly below.

Depending on the specific application, the supporting fabric 2 may be of the type used to produce bathing costumes or wetsuits, for example neoprene.

In this solution again, elements are provided for resisting the movement of the muscles. The latter can be applied to the supporting fabric 2 at points variously positioned over the said fabric. For this purpose, means are also provided for securing the resistance elements on the supporting fabric.

In particular, the resistance elements comprise fins 110 which extend from the supporting fabric 2.



Advantageously, the fins comprise a securing surface 111 which is placed in contact with the supporting fabric 2 and a resistance surface 112 which extends outwards substantially perpendicularly to the securing surface 111. Preferably, the shaping of the fins 110 provides for the resistance surface 112 to comprise an arcuate outer edge 113.

The purpose of the fins 110 is that of increasing the resistance which the water offers to the movement of the body or limb.

For this purpose, the fins 110 may be permanently secured to the supporting fabric 2 or may be replaced, depending on the amount of resistance the athlete requires.

In this latter case, shown in Figures 12 and 13, the means for securing the fins 110 on the supporting fabric 2 are advantageously structured so as to bring about releasable securing. To bring about this situation, the means for securing may, for example, comprise retaining elements 120 solidly fixed to the supporting fabric 2.

A detail of the abovementioned retaining elements 120 is illustrated on an enlarged scale in Figure 13. In this case, the retaining elements 120 are produced with a hollow profile of rectangular section, closed at the

bottom and open at the top. The profile defines a seating 121 which is accessible from above and shaped to match the securing surface 111 of the fin 110. The outer face of the retaining element 120 comprises a slit 122  
5 which allows the resistance surface 112 to extend towards the outside of the garment.

The garment 100 may also comprise some of the elements previously described in the solution shown in Figure 1. Specifically, as shown in Figure 12, the  
10 supporting fabric 2 may comprise reinforced bands 15a, 15b, 15c, 15d, 15e and 15f similar to those already described previously. In addition to those positioned at the location of the means for securing the fins 110, the chest band 15a and the waist band 15f may also be  
15 provided. As in Figure 1, Figure 12 also simultaneously shows the version in which the resistance elements are applied to the supporting fabric 2 and that in which they are applied thereto at the position of the reinforced bands. For the purposes of example only, the  
20 fins of the left forearm of the user have been applied directly to the supporting fabric 2 while the others have been applied thereto at the position of the respective reinforced bands.

In addition, the supporting fabric 2 may comprise  
25 non-deformable bands which connect the portions of

supporting fabric to which the means for securing the resistance elements are solidly fixed and, in particular, which interconnect at least two reinforced bands.

5       The method of use of this latter version of the sports garment 100 is similar to that of Figure 1, with the difference that training is performed in water. The fins 110 may be substituted by fins of larger or smaller dimensions so as to provide greater or lesser resistance  
10 to movements. This is achieved simply by removing the fin from its associated seating 121 and inserting another fin of different dimensions. More particularly, the securing surface is substantially equal in order to adapt to the seating 121, while the dimensions of the  
15 resistance surface 112 vary.

Figures 16 to 18 show a possible alternative embodiment of the sports garment of Figure 1. In this case again, for simplicity of description, the elements described in the example of Figure 1 and which recur in  
20 substantially identical form in Figures 16 to 18 are designated by the same reference numbers and will be described below only with reference to the elements that differ from the garment of Figure 1.

In the abovementioned embodiment shown in Figures  
25 16 to 18, the supporting fabric 2 comprises electrodes

to stimulate the appropriate muscles. In particular, 200a has been used to designate electrodes located in the region corresponding to the abdominal muscles, 200b has been used to designate electrodes positioned in the region of the arm, 200c has been used to designate electrodes positioned in the region of the thighs, 200d has been used to designate electrodes positioned in the region of the calves, and finally 200e has been used to designate electrodes positioned in the region of the gluteal muscles.

Each electrode is provided with at least one connecting element 201 which extends to the outside of the supporting fabric 2.

Correspondingly, an electrical stimulator 202 is provided, applied to the supporting fabric 2 in a region accessible to the user of the garment, for example at the position of the waist region. The electrical stimulator 202 is also provided with connecting elements 203; for example, in the garment shown, four connecting elements 203 are provided. The electrical stimulator 202 is, for example, accommodated in a pocket 204 applied to the supporting fabric 2, for example in the vicinity of the waist. Advantageously, the pocket 204 may provide a window 205 to enable access to the controls of the electrical stimulator. Selectively, the electrodes can

be connected to the electrical stimulator 202 by means of wires 206 outside the supporting fabric 2 which unite the connecting elements 201 to the connecting elements 203.

5       With regard to the functioning of this latter alternative embodiment, the garment may be used as previously described to obtain an "active" form of training, meaning one in which the user actively performs exercises and correspondingly exerts a physical  
10   effort. In addition to this possible use, it is possible to perform a "passive" form of training, meaning one in which the muscles are stimulated by means of alternating contractions and relaxations as a consequence of the action produced locally by the electrical stimulator via  
15   the corresponding electrodes. For this purpose, the electrodes can be connected to the electrical stimulator by means of the wires 205, the electrodes being selected, for example four at a time, as a function of the muscles which it is desired to stimulate.

20       As may be appreciated from the description, the sports garment according to the present invention makes it possible to meet the abovementioned requirement of increasing the efficacy of training activities and strengthening and/or toning certain muscle fasciae by  
25   means of the performance of selective exercises, without

any need to have to arrange for the correct positioning of weights and/or elastic elements and without giving rise to any disruption of the normal movements of the athlete.

5           Furthermore, the sports garment according to the invention makes it possible to reduce the risks of damage to the muscles and/or the skeletal structure caused by exercises performed incorrectly as a result of the incorrect positioning of the equipment used.

10           A further advantage of the sports garment according to the invention lies in the possibility of using it to replace complex, bulky and expensive machines, and in the unaccustomed structural simplicity thereof, which enables it to be produced for a moderate cost.

15           By virtue of the original presence of elements resisting the movement of the muscles, it is possible to obtain an efficacious and simple training instrument, which can be used by both professional and non-professional athletes.

20           The versatility of the embodiment and of the positioning of the resistance elements offers virtually unlimited possibilities for the muscle strengthening and/or toning exercises.

          The presence of the means for securing the  
25 resistance elements on the supporting fabric renders the

use of the abovementioned garment particularly simple and versatile.

The elasticity of the supporting fabric combined with its shape make it possible to cause the garment to  
5 cling to the body of the user without therefore obstructing his movements. This advantage is further ensured by the arcuate shape of the weights, which therefore project to a limited extent from the surface of the supporting fabric.

10 The presence of reinforced bands and non-deformable bands prevents the fabric being pulled out of shape by the action of the weights or of the elastic elements or by the resistance offered by the fins. The production of these bands does not introduce complications during the  
15 stage of manufacture of the garment, in that they can be easily applied, for example by means of stitching or adhesive bonding, or even made during the actual process of shaping of the garment.

A particularly advantageous fact is that the  
20 pockets are shaped to match the shape of the weight, so as to prevent the latter being able to move within them.

A further advantage is represented by the closure means which prevent the escape of the weight.

The fixed position of the rings 20 makes it  
25 possible to perform correctly exercises envisaging the

use of the elastic elements 18.

To this advantage may be added the fact that the shaping of the hooks prevents possible escaping of the latter during use and therefore permits the athlete to  
5 perform all the necessary movements.

In the case of the version for performing movement and/or training activities in water, the shape of the fins is particularly advantageous, allowing replacements as a function of the resistance required and, during  
10 use, being capable of offering the necessary rigidity not to bend as a result of the resistance provided by the water.

In addition to the advantages mentioned above, the solution shown in Figures 16 to 18 makes it possible to  
15 obtain greater versatility of the sports garment according to the present invention, in that it is possible to perform both training of the "active" type and training of the "passive" type. Specifically, whereas the former comprises exercises actively  
20 performed by the user and intended to overcome the resistance offered by the resistance means 5, 18, 110, the latter provides for the alternating contraction and relaxation of selected muscle fasciae by means of local electrical stimulation. Furthermore, this solution does  
25 not give rise to errors with the positioning of the



electrodes, in that the latter are already correctly positioned on the supporting fabric 2.

It is clear that alternative embodiments and/or additions can be provided as well as what has been  
5 described and illustrated above.

In alternative a, as shown in Figure 1, the fastener 3 may be replaced by other means for putting on the said garment, such as buttons, laces or hooks, substantially of a known type and therefore not shown.

10 In another alternative shown in Figure 15, with reference to the version having weights but nevertheless also applicable to the version having fins, the sports garment forming the subject of the present invention can be produced in two pieces, thus comprising an upper  
15 portion 1a in the form of a jacket which encloses the trunk and the upper limbs and a lower portion 1b which encloses the lower limbs of the user.

To support the lower portion 1b, provision may advantageously be made for the latter to comprise braces  
20 130 which are positioned on the shoulders of the user.

All the resistance elements shown may be applied at various points on the garment, those shown representing only a non-limiting example. The position of the resistance elements according to Figure 1 or Figure 12  
25 is indicative and may be varied, for example by

providing pockets or fins applied to the reinforced band 15f which is positioned at the waist, or by introducing rings 20 applied to the reinforced band 15a which is positioned in the chest region.

5       The pockets 4b, 4c, 4d and 4e may be produced as pockets which are also continuous on the bands of the arms and of the thighs or individual pockets 4a may be applied on the chest as well.

10       In all cases in which velcro is envisaged as a closure element, equivalent means such as laces, buttons or the like may be used.

15       As an alternative to what is shown in Figures 8 and 9, the hooks 19 may be applied directly to the supporting fabric 2, even without the interposition of the rings 20. It is also clear that the exercises shown in Figures 8, 10 and 11 represent a number of non-limiting examples of application of the elastic elements 18.

20       Finally, as an alternative to the garment 100 shown in Figure 12, in addition to the fins 110, the rings 20 or the hooks 19 may be provided in order to use the elastic elements in the case of aquatic gymnastics as well.

25       In the case shown in Figures 16 to 18, the supporting fabric 2 simultaneously comprises the

electrodes, the pockets 4a-4e and the hooks 19 for securing the elastic elements 18, although alternative embodiments may also be envisaged in which the supporting fabric comprises the electrodes and only the  
5 pockets or the electrodes and only the hooks.

In addition to what is shown in the preferred embodiments of the sports garment described above, a person skilled in the art, in order to meet contingent and specific requirements, may introduce numerous  
10 changes, adjustments and replacements of elements with other, functionally equivalent elements, without thereby departing from the scope of the Claims that follow.

## CLAIMS

1. Sports garment (1, 100) for training, comprising:

5 a supporting fabric (2) which encloses, at least partially, the user's body;

resistance elements (5, 18, 110) opposing the movement of the muscles and applicable to the supporting fabric (2) at points variously positioned over the said  
10 fabric to generate a resistance depending on the type of effort to be exerted; and

means (4a-4e, 19, 20, 120) for securing the resistance elements (5, 18, 110) on the supporting fabric (2), the said means being operatively connected  
15 to the said supporting fabric.

2. Sports garment for training according to Claim 1, in which the supporting fabric (2) is shaped as a track suit which encloses the user's trunk and limbs.

3. Sports garment for training according to Claim  
20 2, in which the track suit is produced in a single piece which encloses the user's body.

4. Sports garment for training according to Claim  
2, in which the track suit comprises an upper portion (1a) which encloses the trunk and the upper limbs and a  
25 lower portion (1b) which encloses at least the user's

lower limbs.

5. Sports garment for training according to Claim 4, in which the lower portion (1b) comprises braces (130) which are positioned on the shoulders of the user to support the said lower portion.

6. Sports garment for training according to one or more of the preceding Claims, in which the supporting fabric (2) is of the elastic type in order to cling to the user's body.

7. Sports garment for training according to one or more of the preceding Claims, in which the supporting fabric (2) comprises means (3, 30) for putting on the said garment.

8. Sports garment for training according to Claim 7, in which the means for putting on the garment comprise a fastener (3, 30), which extends over at least part of the length of the user's trunk.

9. Sports garment according to one or more of the preceding Claims, in which the resistance elements (5, 18, 110) are applied in the user's chest region.

10. Sports garment according to one or more of the preceding Claims, in which the resistance elements (5, 18, 110) are applied in the region of the user's arms, between the shoulders and the elbows.

11. Sports garment according to one or more of the

preceding Claims, in which the resistance elements (5, 18, 110) are applied in the region of the user's forearms, between the elbows and the wrists.

12. Sports garment according to one or more of the  
5 preceding Claims, in which the resistance elements (5, 18, 110) are applied in the region of the user's thighs.

13. Sports garment according to one or more of the preceding Claims, in which the resistance elements (5, 18, 110) are applied in the region of the user's calves.

10 14. Sports garment according to one or more of the preceding Claims, in which the resistance elements (5, 18, 110) are applied in the region of the user's waist.

15 15. Sports garment for training according to one or more of the preceding Claims, in which the supporting fabric (2) comprises reinforced bands (15a-15f) provided in the same position as the means (4a-4e, 19, 20, 120) for securing the resistance elements (5, 18, 110).

20 16. Sports garment for training according to Claims 9 and 15, in which the reinforced band (15a) in the position of the chest region comprises extensions (16) which are positioned on the user's shoulders.

25 17. Sports garment for training according to Claim 15 or 16, in which the reinforced bands (15a-15f) comprise at least one further layer of fabric applied to the supporting fabric (2).

18. Sports garment for training according to Claim 15 or 16, in which the reinforced bands (15a-15f) are produced directly in the supporting fabric.

19. Sports garment for training according to one  
5 or more of the preceding Claims, in which the supporting fabric (2) comprises non-deformable bands (17a-17c) which connect the portions of supporting fabric (2) to which the means (4a-4e, 19, 20, 120) for securing the resistance elements (5, 18, 110) are solidly fixed.

10 20. Sports garment for training according to Claim 19, in which the non-deformable bands (17a-17c) comprise at least one further layer of fabric applied to the supporting fabric (2).

21. Sports garment for training according to  
15 Claims 15 and 19, in which the non-deformable bands (17a-17c) interconnect at least two reinforced bands (15a-15f).

22. Sports garment for training according to one  
or more of the preceding Claims, in which the resistance  
20 elements comprise weights (5) that can be variously positioned over the supporting fabric (2) of the garment (1).

23. Sports garment for training according to Claim 22, in which the weights (5) comprise at least an  
25 arcuate outer surface (6).

24. Sports garment for training according to Claim 22 or 23, in which the means for securing the resistance elements comprise pockets (4a-4e) applied to the supporting fabric (2) to accommodate at least one weight 5 (5).

25. Sports garment for training according to Claims 15 and 24, in which the pockets (4a-4e) are applied at the position of reinforced bands (15a-15f).

26. Sports garment for training according to Claim 10 24 or 25, in which the pockets (4a-4e) comprise closure means (10) for preventing the escape of the weight (5).

27. Sports garment for training according to Claim 26, in which the closure means (10) comprise a flap (11) having a first end solidly fixed to the supporting 15 fabric (2) and a second end that can be removably fixed to the pocket (4a-4e).

28. Sports garment for training according to one of Claims 24 to 27, in which two adjacent pockets (4a) comprise lateral adhesion means (13).

20 29. Sports garment for training according to one of Claims 24 to 28, in which the resistance elements comprise a pocket (40) having a triangular shape and applied centrally in the chest region of a female version of the sports garment (1).

25 30. Sports garment for training according to one



or more of the preceding Claims, in which the resistance elements comprise elastic elements (18) of which both ends can be fixed to the supporting fabric (2).

31. Sports garment for training according to Claim 5 30, in which the means for fixing the elastic elements (18) comprise hooks (19) operatively connected to the ends of the elastic elements (18) and to the supporting fabric (2).

32. Sports garment for training according to Claim 10 31, in which the hooks (19) comprise at least one portion (19a) which can be moved between a closure position and an open position.

33. Sports garment for training according to Claim 15 31 or 32, in which the fixing means further comprise rings (20) variously positioned over the supporting fabric (2).

34. Sports garment for training according to Claims 15 and 33, in which the rings (20) are applied at the position of reinforced bands (15a-15f).

20 35. Sports garment for training according to one or more of Claims 1 to 21, in which the resistance elements comprise fins (110) which extend from the supporting fabric (2).

36. Sports garment for training according to Claim 25 35, in which the fins (110) comprise a securing surface

(111) which is placed in contact with the supporting fabric (2) and a resistance surface (112) which extends substantially perpendicularly to the securing surface (111).

5        37. Sports garment for training according to Claim 36, in which the resistance surface (112) comprises an arcuate outer edge (113).

38. Sports garment for training according to one of Claims 35 to 37, in which the means for securing the  
10 fins (110) on the supporting fabric (2) are structured so as to bring about releasable securing.

39. Sports garment for training according to Claims 36 and 38, in which the means for securing  
comprise retaining elements (120) solidly fixed to the  
15 supporting fabric (2) and which define seatings (121) accessible at least from above and shaped to match the securing surface (111) of the fin (110) in order to  
receive the latter.

40. Sports garment for training according to any  
20 one of Claims 1 to 34, in which the supporting fabric (2) comprises electrodes (200a-e) for local stimulation of the muscles.

41. Sports garment for training according to Claim 40, in which each electrode (200a-e) comprises at least  
25 one connecting element (201) which extends to the

41

outside of the supporting fabric (2).

42. Sports garment for training according to Claim  
40 or 41, in which the supporting fabric (2) comprises  
an electrical stimulator (202) provided with connecting  
5 elements (203).

43. Sports garment for training according to Claim  
42, in which the supporting fabric (2) comprises a  
pocket (204) for accommodating the electrical stimulator  
(202).

10 44. Sports garment for training according to Claim  
43, in which the pocket (204) comprises a window (205)  
to enable access to the controls of the electrical  
stimulator (202).

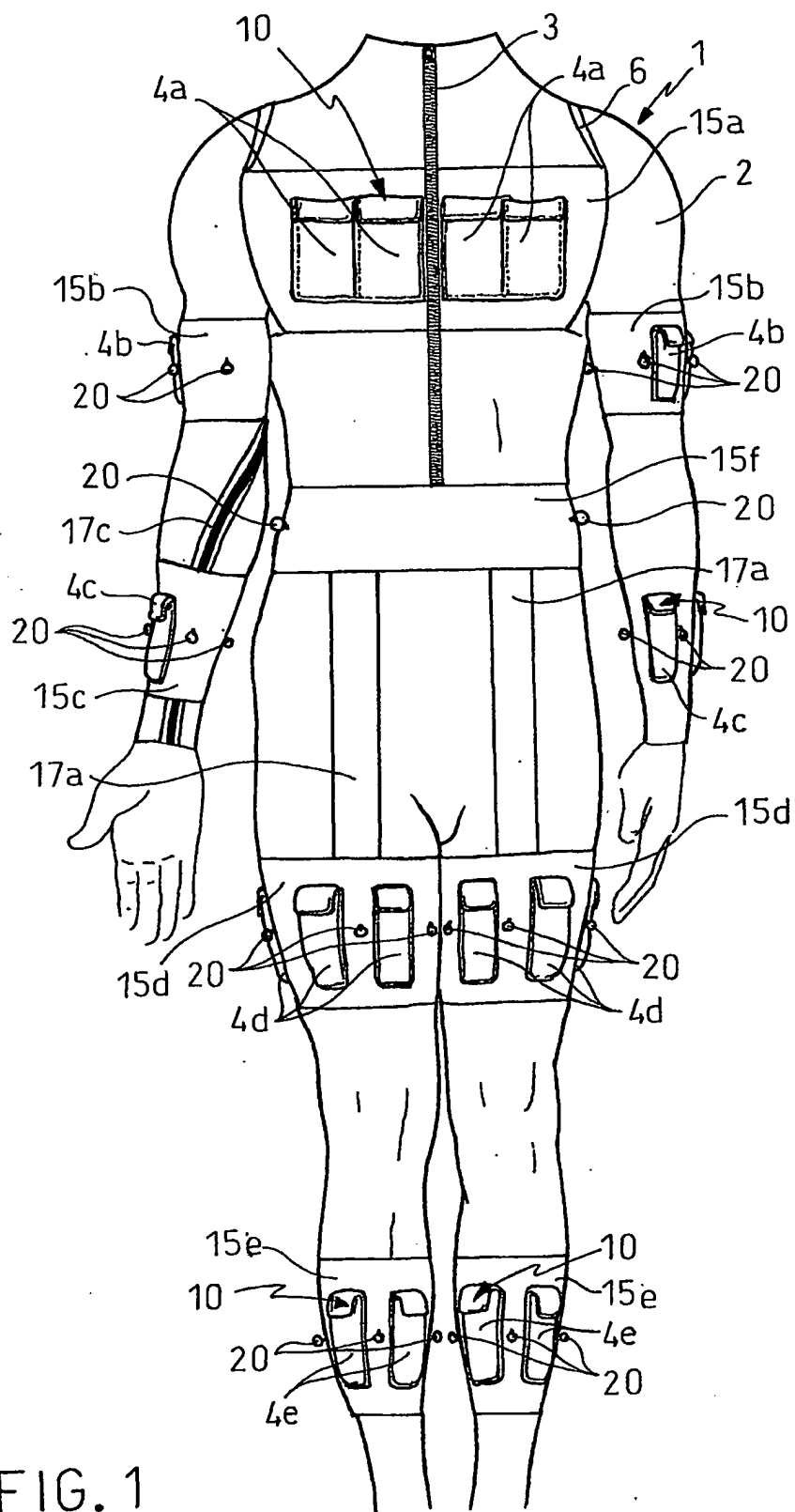
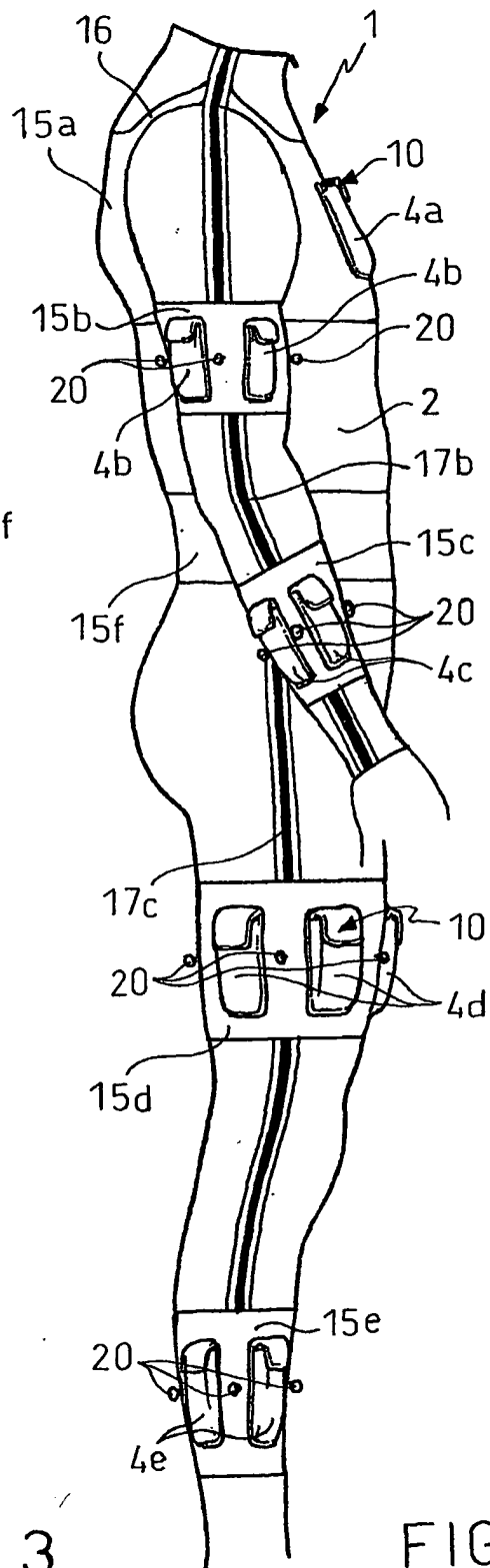
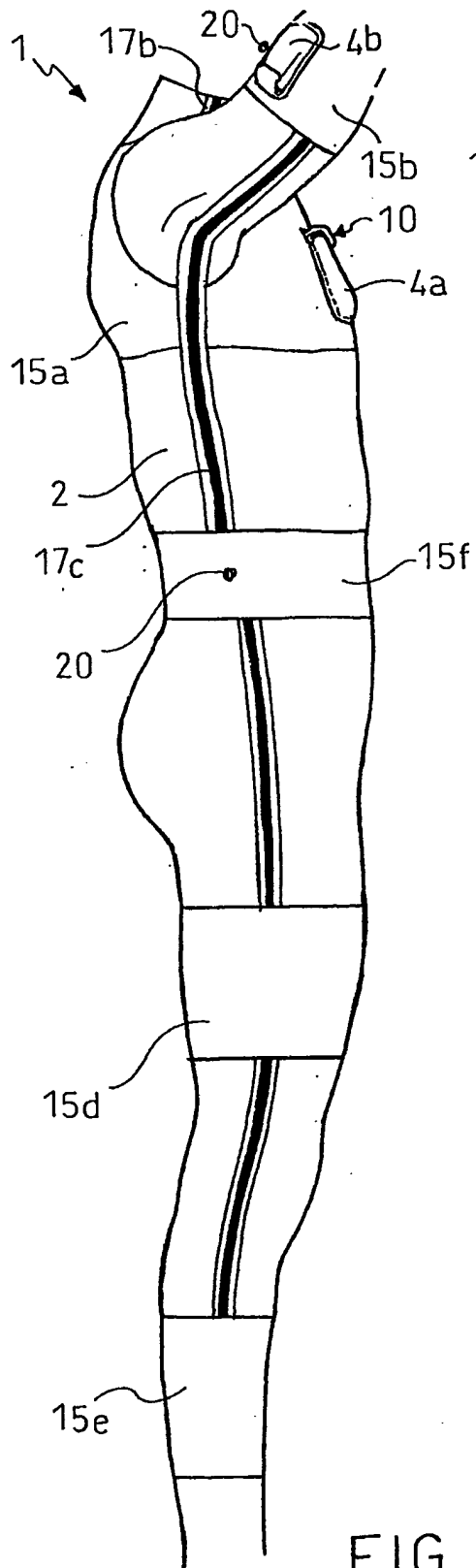


FIG. 1



3/12

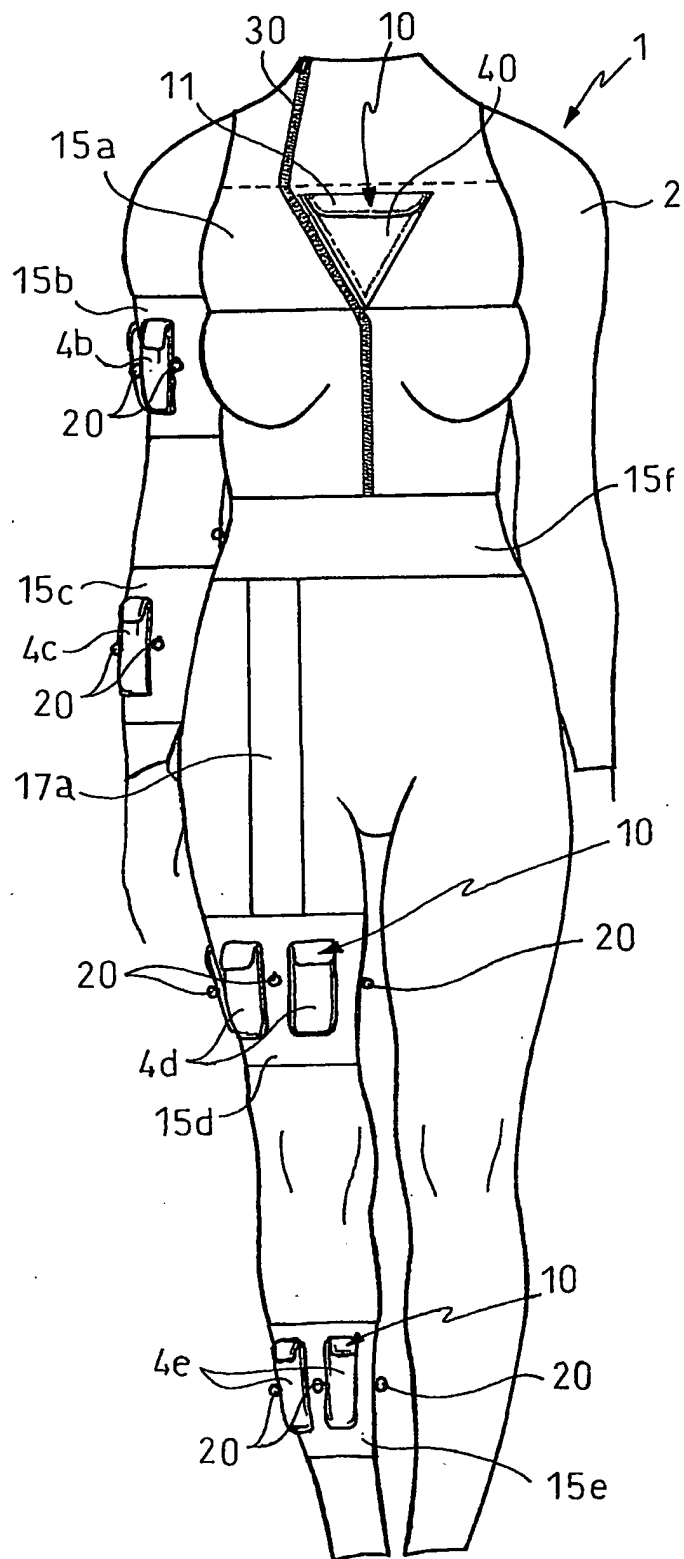


FIG. 4

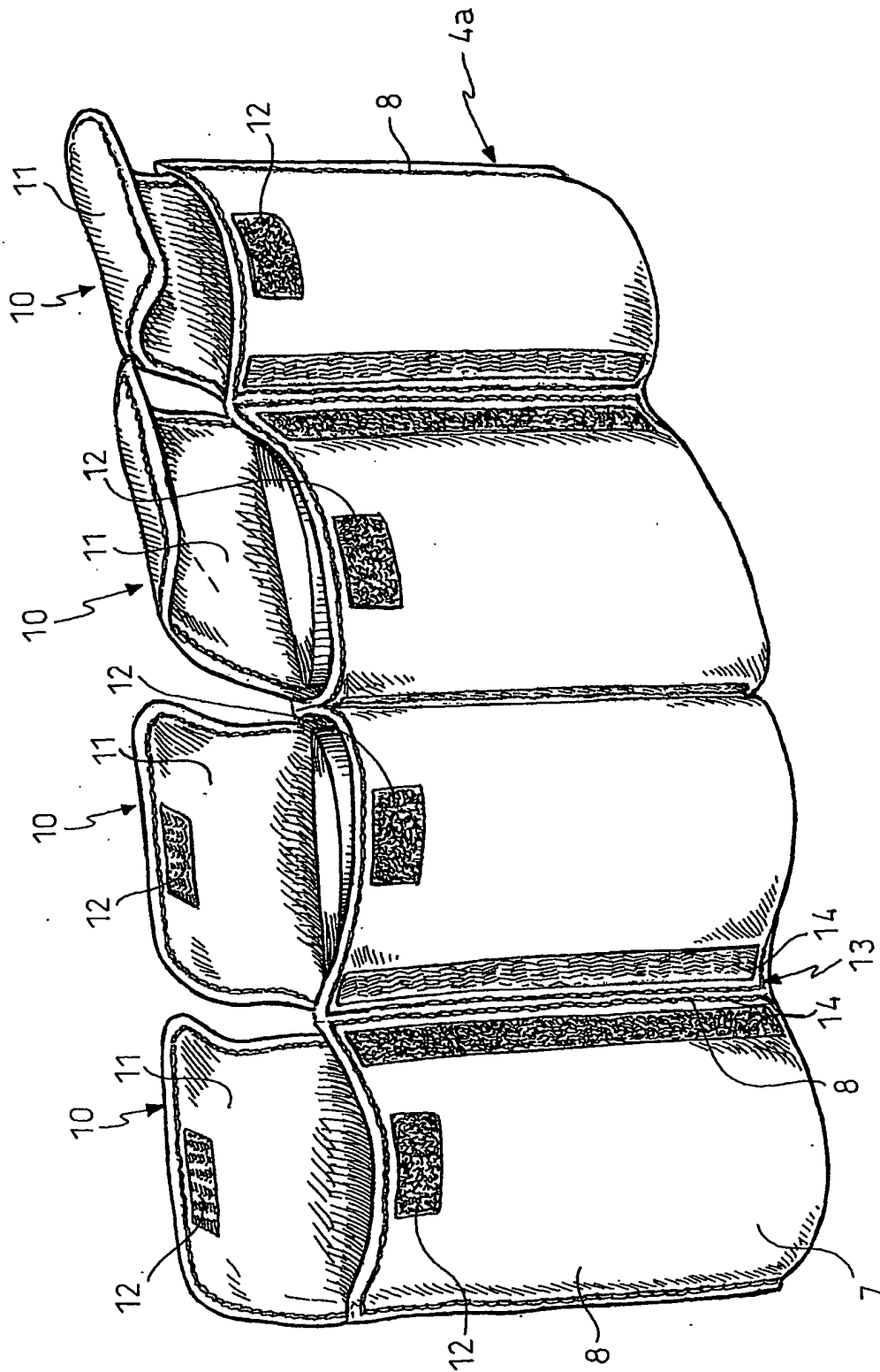


FIG.5

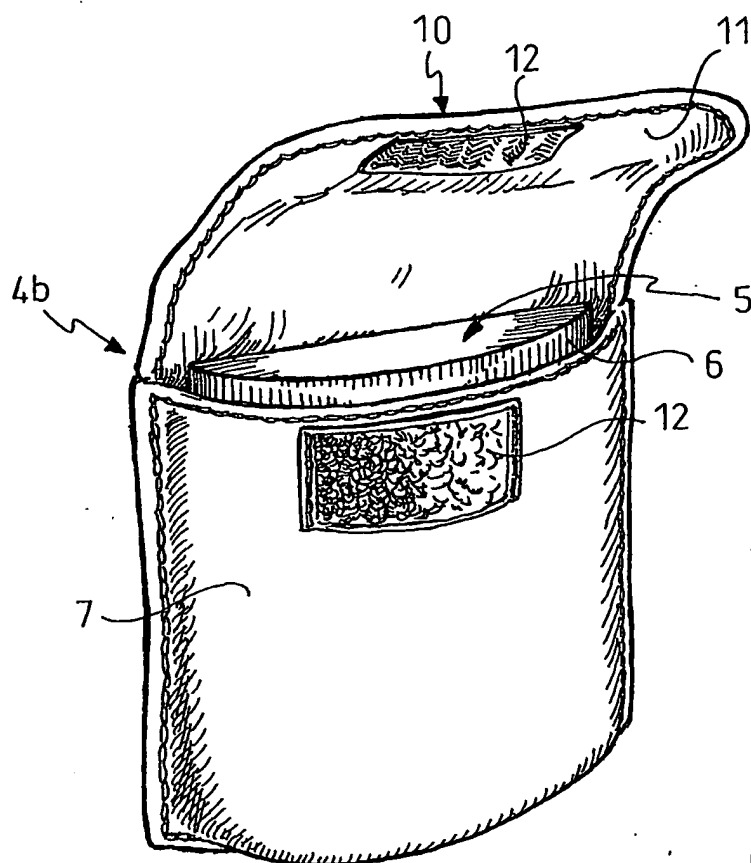


FIG. 6

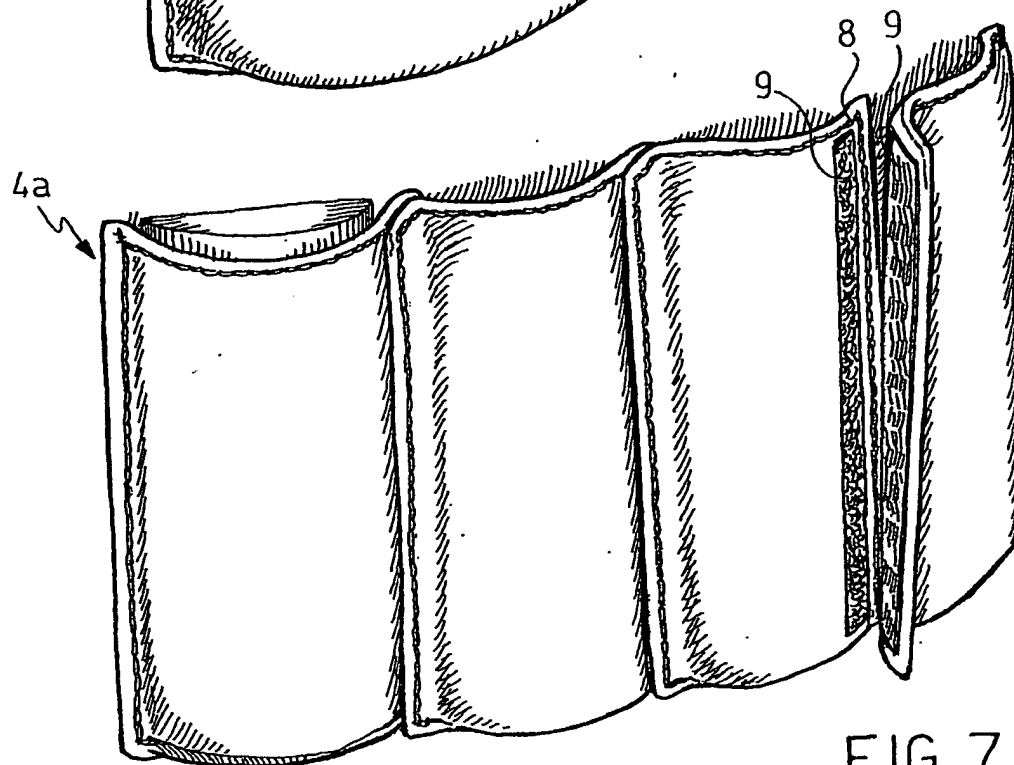
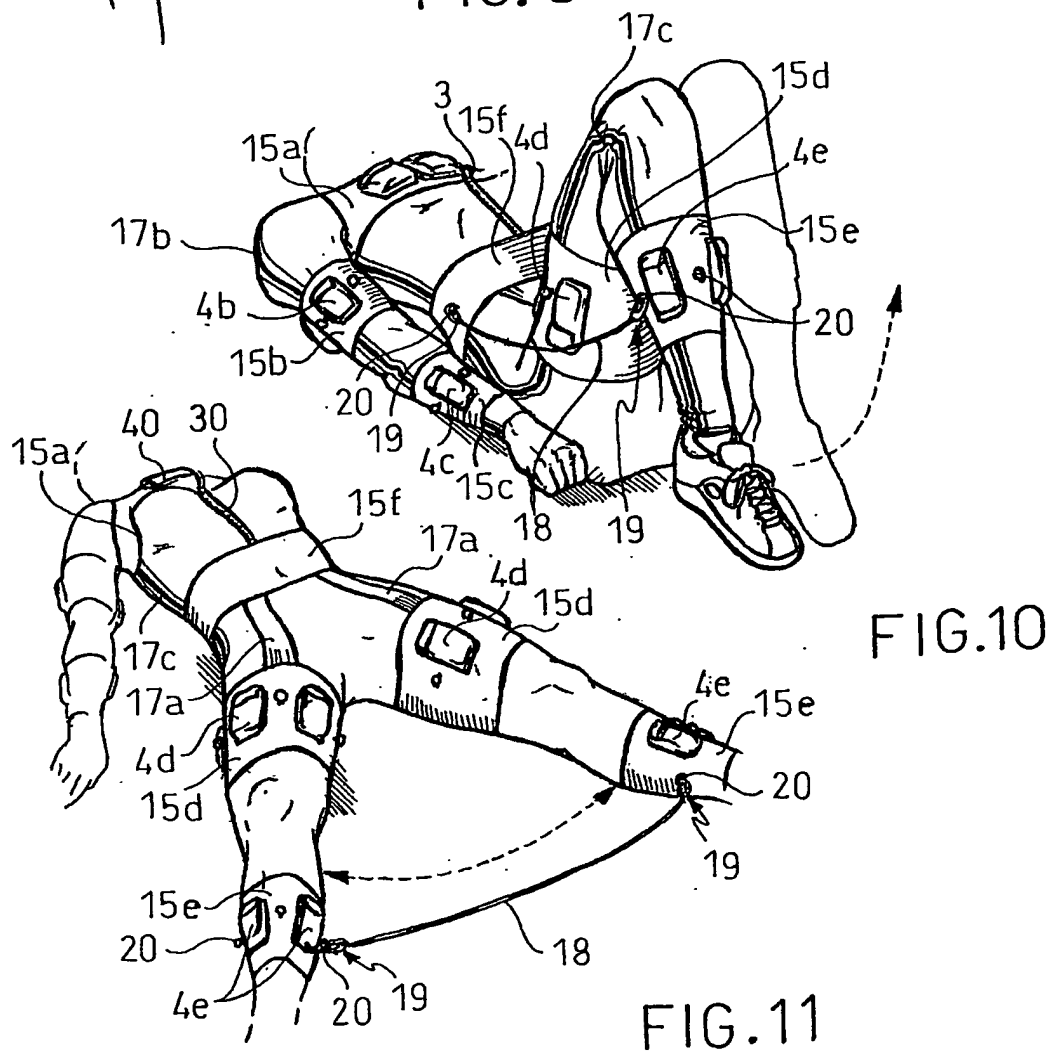
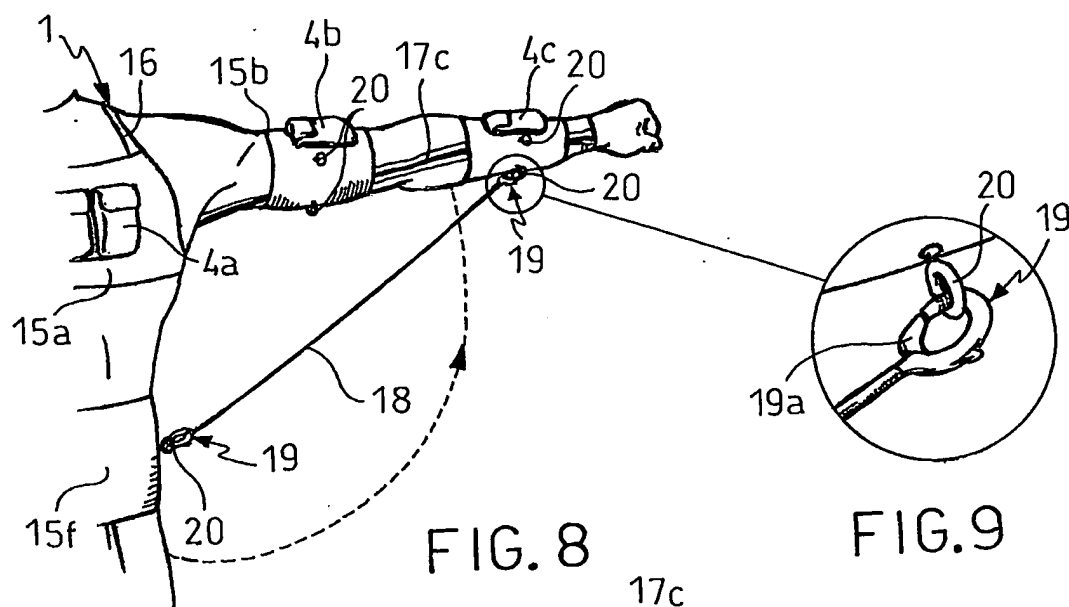
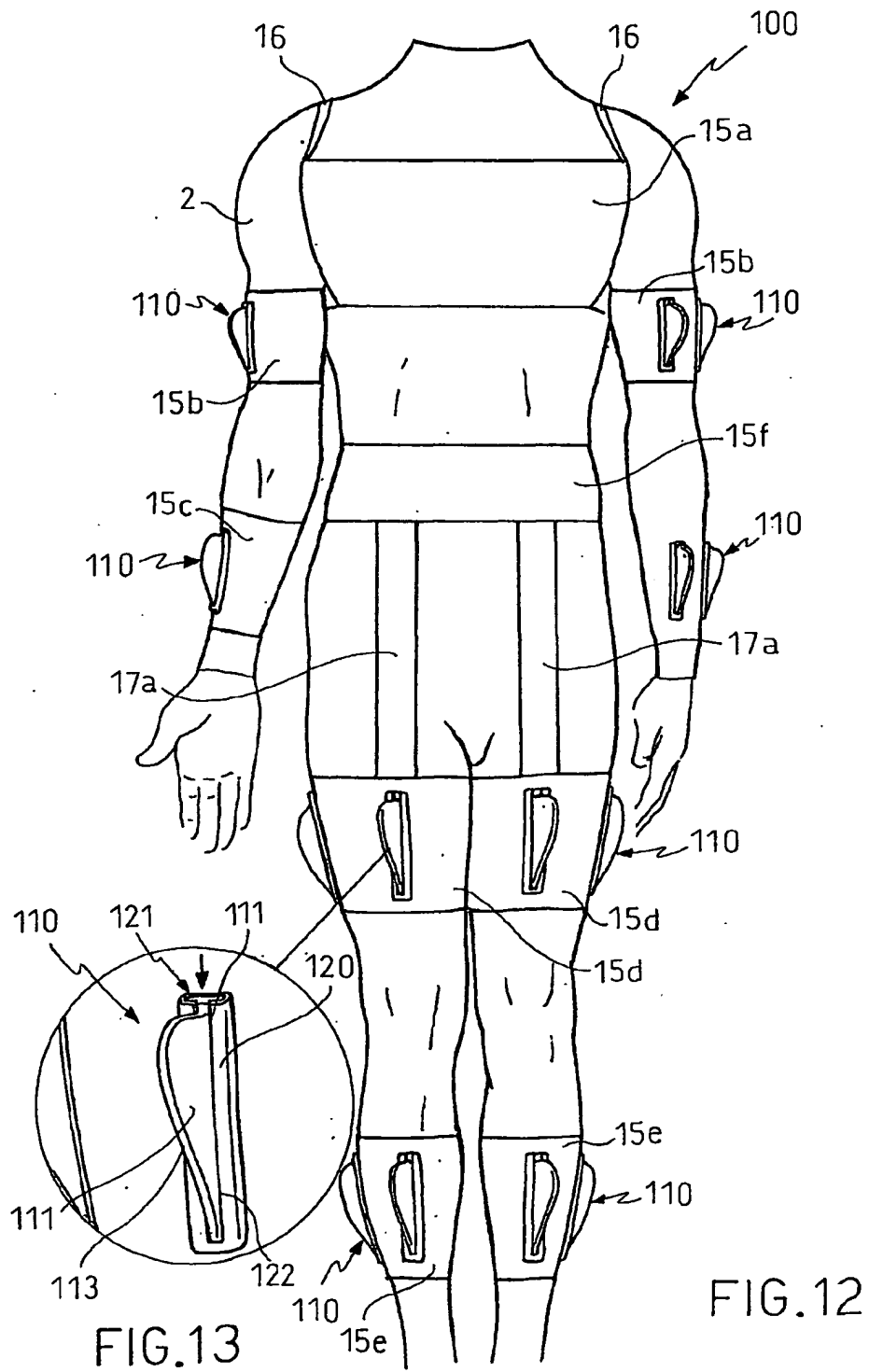


FIG. 7





7/12



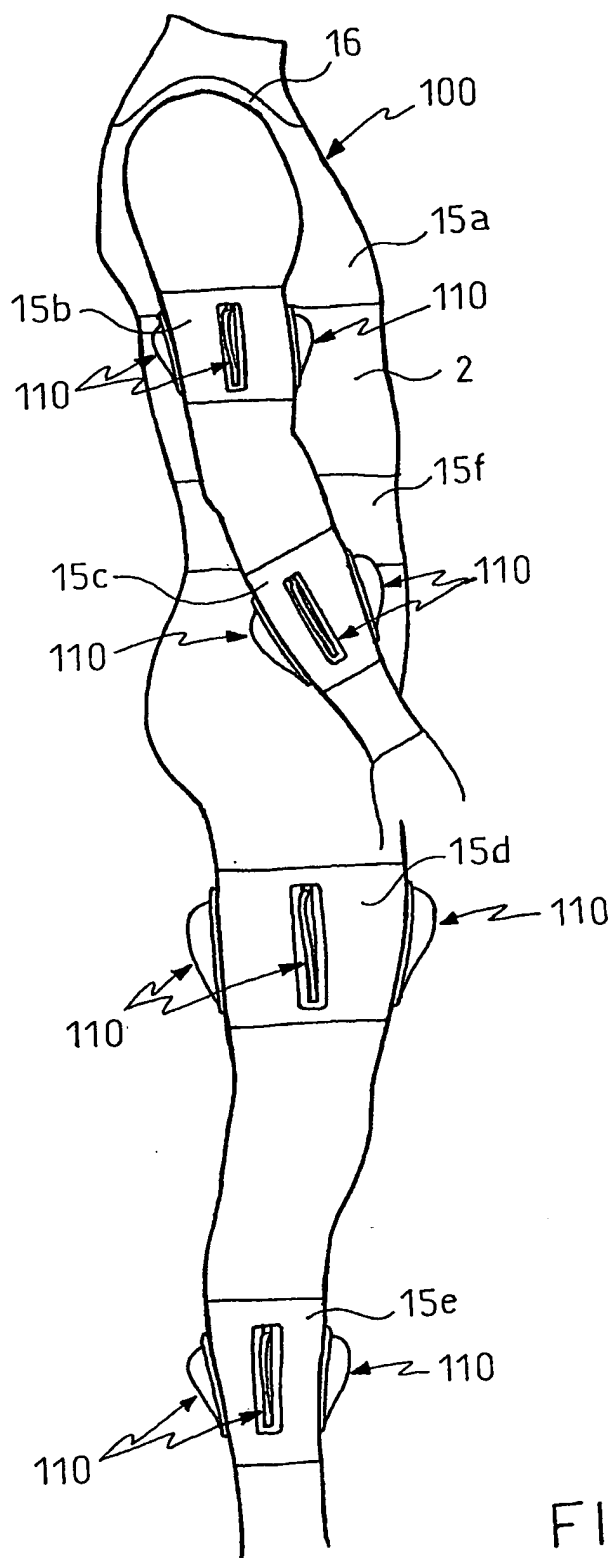


FIG.14

9/12

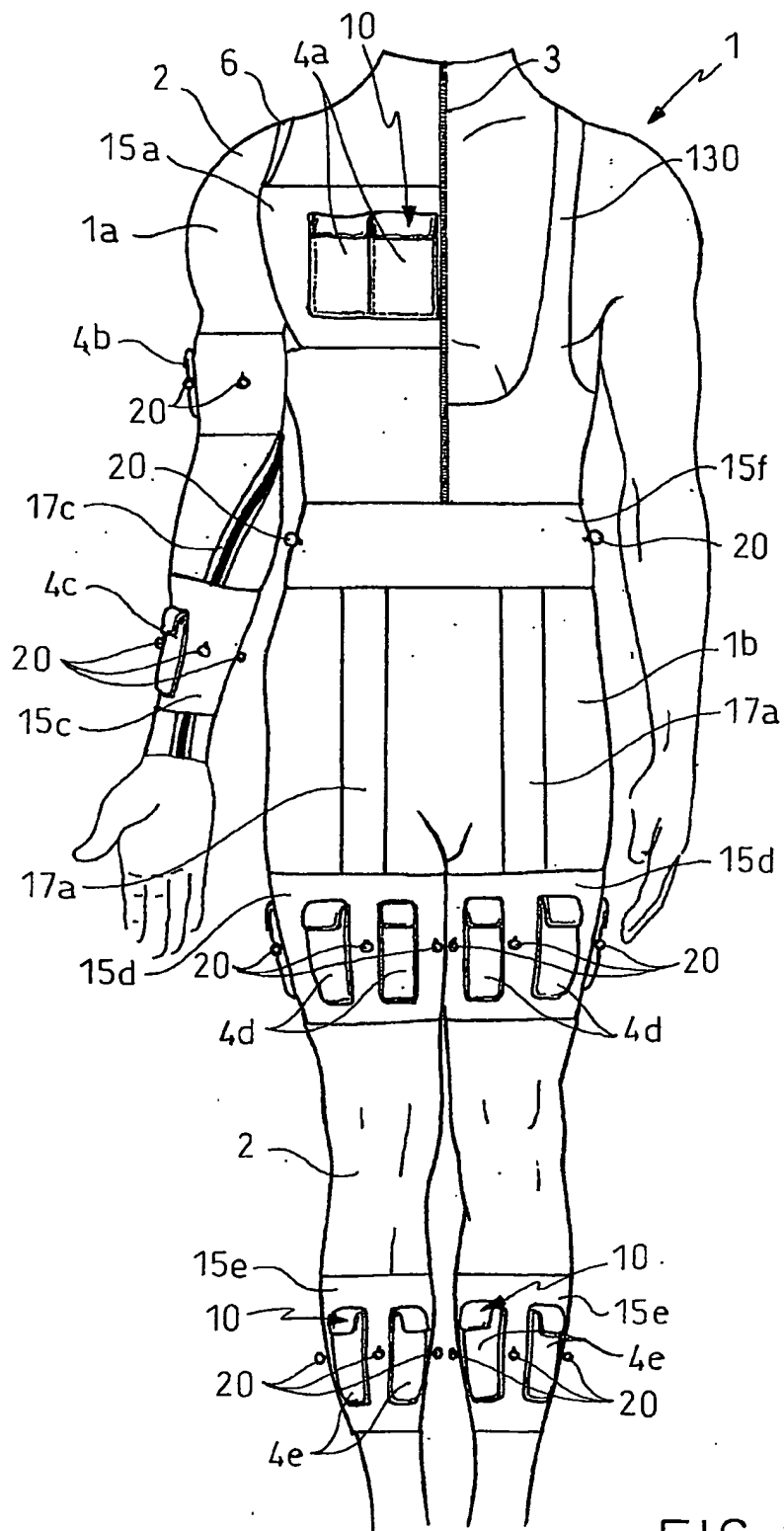


FIG.15

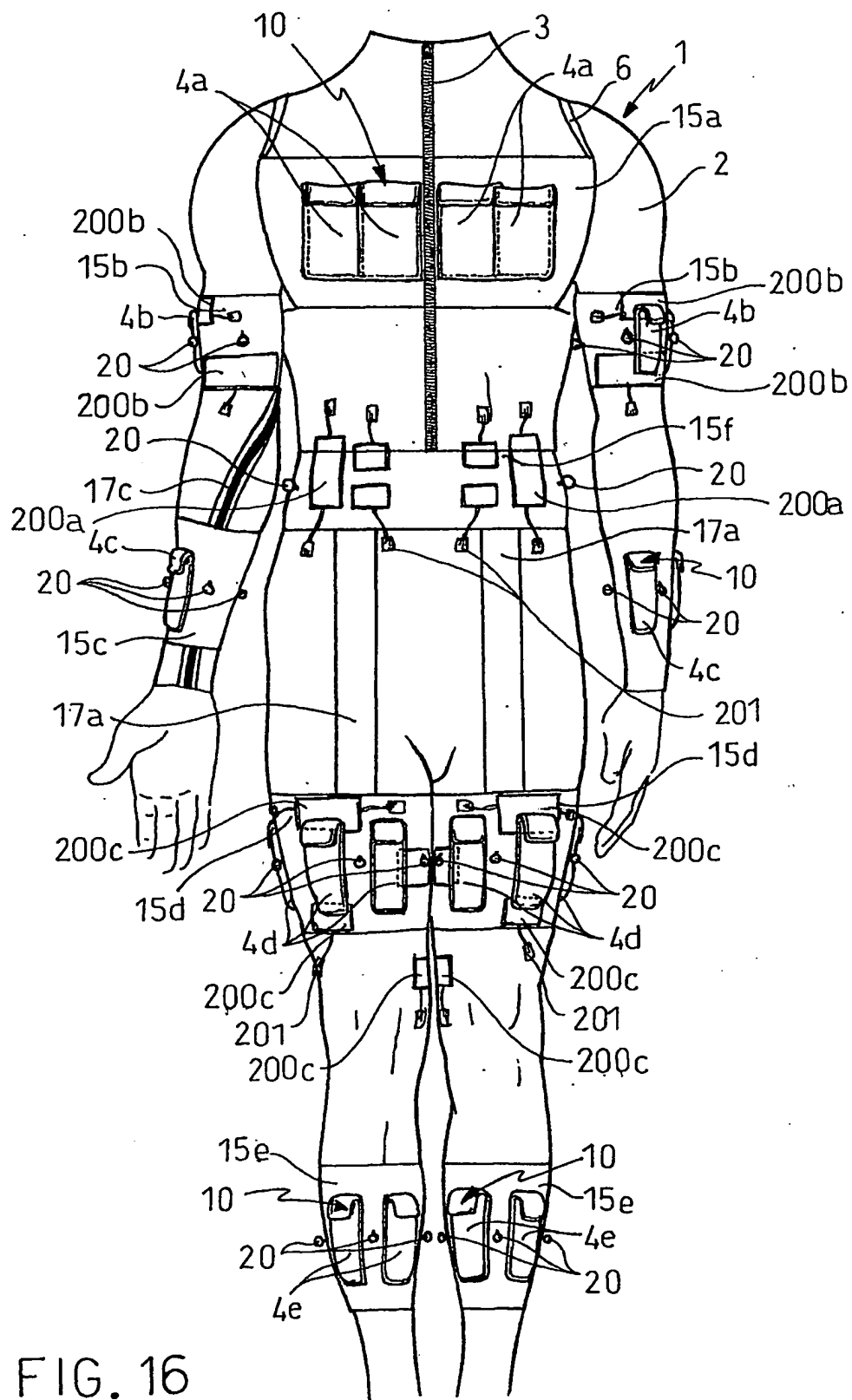


FIG. 16

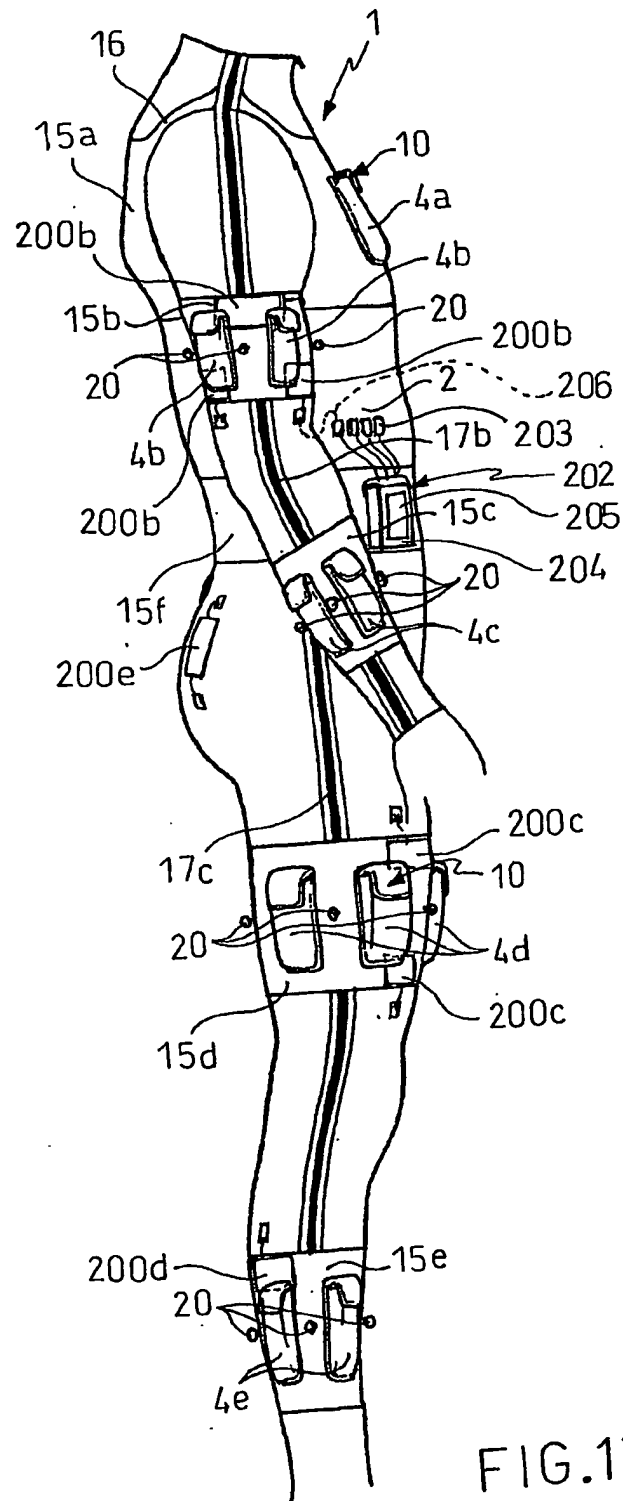


FIG.17

12/12

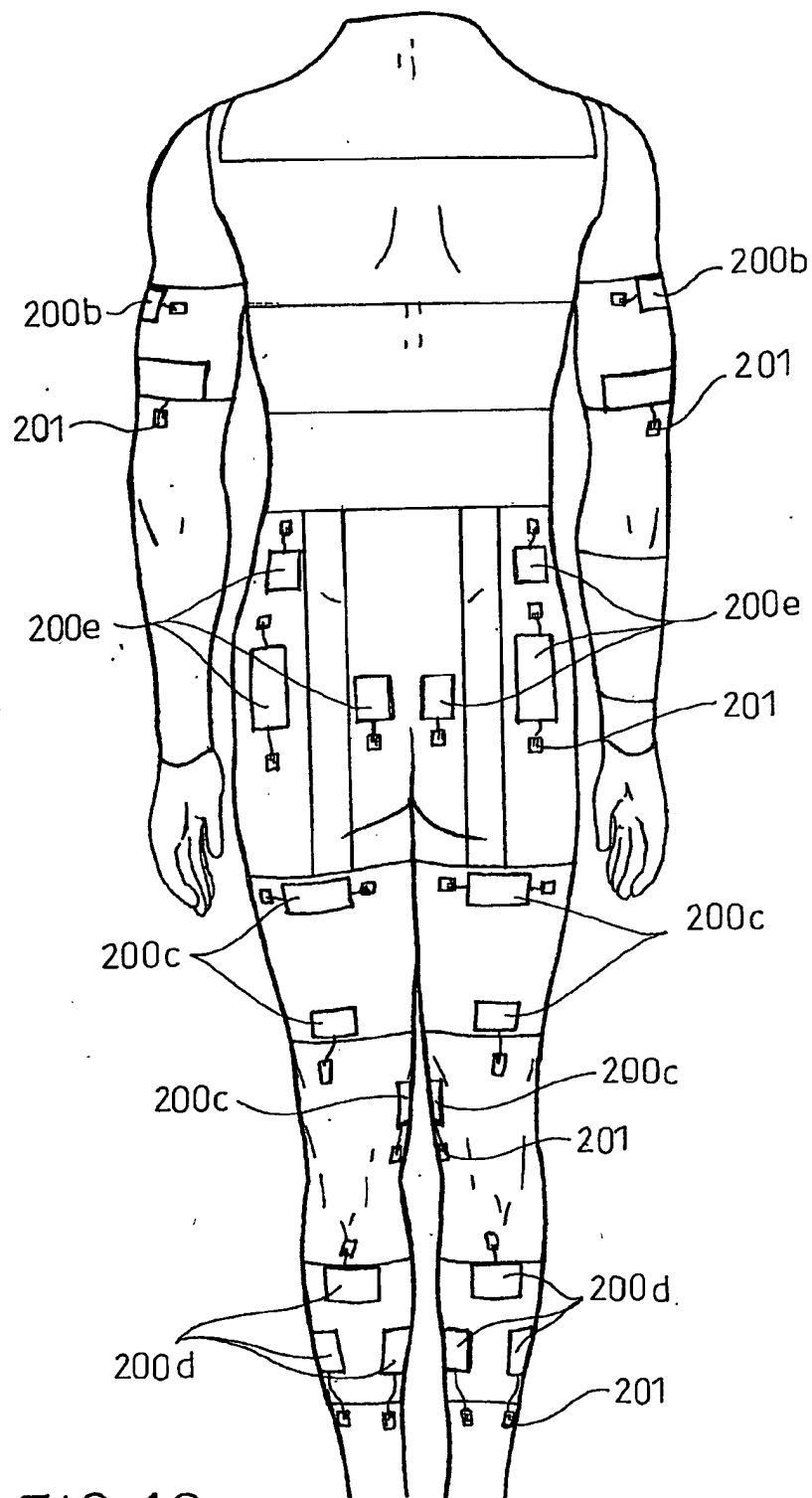


FIG. 18

# INTERNATIONAL SEARCH REPORT

International Application No

PC I 00/00495

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A63B21/065 A63B21/055 A63B21/008

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A63B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 937 441 A (RAINES MARK T) 17 August 1999 (1999-08-17)  column 6, line 54 - line 61; figures column 7, line 26 - line 50 column 9, line 12 - line 14 column 10, line 62 - column 11, line 11 ---	1-4, 6-17, 19-22, 24,25
X	EP 0 880 980 A (DIFFUSION PERFORMANCE INTERNATIONAL ET AL.) 2 December 1998 (1998-12-02) page 6, line 40 - page 7, line 6; figures 1,2,6,7  --- -/--	1-3, 9-15,17, 22

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

17 July 2001

Date of mailing of the international search report

05. 11. 01

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Mark Jones



## INTERNATIONAL SEARCH REPORT

International Application No

P( T 00/00495

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 033 117 A (FAIRWEATHER PHIL F) 23 July 1991 (1991-07-23)	1,6,7, 12,19, 20,22, 24,26,27
A	column 2, line 42 -column 4, line 4; figures ---	2-5,28
X	US 5 144 694 A (CONRAD DA OUD EMILIE ET AL) 8 September 1992 (1992-09-08)	1,6-9, 12,14, 22,23,26
A	column 6, line 59 - line 61; figures column 7, line 42 - line 45 abstract ---	29
X	US 5 010 596 A (BROWN DARRYL L ET AL) 30 April 1991 (1991-04-30) abstract; figures ---	1-4,6-9, 12,22-24
A	WO 99 39776 A (COOK ARNOLD J) 12 August 1999 (1999-08-12) page 5, line 7 -page 8, line 23; figures 1-3 ---	28
X	US 6 047 405 A (WILKINSON WILLIAM T) 11 April 2000 (2000-04-11)  column 4, line 49 -column 5, line 14; figures 8,9 -----	1-4,11, 13,22, 26,27

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/IT 00/00495

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-29

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/SA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-29

Sports garment for training in which resistance elements  
comprise weights

2. Claims: 1,30-34

Sports garment for training in which resistance elements  
comprise elastic elements

3. Claims: 1,35-39

Sports garment for training in which resistance elements  
comprise fins

4. Claims: 1,40-44

Sports garment for training comprising muscle stimulating  
electrodes

## INTERNATIONAL SEARCH REPORT

International Application No

PI T 00/00495

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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